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## Biology: Photosynthesis & Cellular Respiration Web Quest

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### I. ATP

<http://www.biologyinmotion.com/atp/index.html>

1. How is ATP like a recharged battery?
2. When the battery needs to be recharged, what kind of molecule is it?
3. What do we do to 'recharge our batteries'?

### II. Photosynthesis

#### Section 1: Overview

<http://biology.clc.uc.edu/courses/bio104/photosyn.htm>

- 1) What is the overall chemical reaction for photosynthesis?
- 2) What are the light reactions and where do they take place?
- 3) How is light reaction energy stored?
- 4) Draw a picture of an ATP molecule:



- 5) What are the output products of the Calvin Cycle?

#### Section 2: Light Reactions

Watch the youtube video at:

<http://www.youtube.com/watch?v=eY1ReqiYwYs>

1. What are the photosystems "made" of?

2. What does sunlight 'excite'?
3. What do the electrons from photosystem II do?
4. How is oxygen gas made?
5. What does ATP synthase use the concentration of hydrogen ions for?
6. Where are the ATP molecules used after the light reactions?

### **Section 3: Calvin Cycle**

[http://faculty.nl.edu/jste/calvin\\_cycle.htm](http://faculty.nl.edu/jste/calvin_cycle.htm)

Play the animations and read the summaries to answer the following:

- 1) What molecules are providing ENERGY for the production of G3P (a simple sugar)?
- 2) How many carbons are recycled in the Calvin Cycle?
- 3) How many molecules of ATP does it take to make one molecule of glucose?
- 4) How many 'turns' of the Calvin Cycle does it take to make one molecule of glucose?

### **III. Cellular Respiration**

<http://www.science.smith.edu/departments/Biology/Bio231/>

Use the links on this page to view the animations and answer the following questions about each stage of cellular respiration.

#### **Section 1: Glycolysis & Fermentation**

Glycolysis is the first step of cellular respiration. It can happen in the presence or absence of oxygen. Click on the glycolysis link and view each step of the animation to answer these questions:

1. Where does glycolysis take place in the cell?
2. How many ATPs are needed to activate a glucose molecule?

3. How many ATPs are generated when pyruvate is formed?
4. What is the "net gain" of ATP molecules through glycolysis?

### Section 2: Krebs Cycle

The Citric Acid Cycle follows glycolysis when oxygen is present in the cell. Click on the Citric Acid Animation and view it step by step to answer the following questions:

1. What three-carbon molecule from glycolysis is used in the Citric Acid Cycle?
2. Where does the citric acid cycle take place?
3. One molecule of pyruvate yields:  
\_\_\_\_\_ CO<sub>2</sub>  
\_\_\_\_\_ FADH<sub>2</sub>  
\_\_\_\_\_ NADH  
\_\_\_\_\_ ATP

### Section 3: Electron Transport Chain

Click on the Electron Transport Chain (ETC) animation and watch it step by step to answer the following questions.

1. Where is the electron transport chain located?
2. Draw a picture of the electron transport chain and illustrate the movement of electrons using arrows:



3. What molecules are supplying electrons to the chain?
4. Electrons are used to 'pump' protons (H<sup>+</sup>) to one side of the membrane. This creates a proton gradient- many H<sup>+</sup> atoms on one side and few or none on the other. The proton (H<sup>+</sup>) gradient is often compared to the energy captured by a river dam. Explain how the electron transport chain might fit this analogy.
5. Where does the energy to make ATP from ADP come from?